What is claimed is:

1. A method to estimate a real and imaginary dilatational wavespeed of a material, said method comprising the steps of:

providing a specimen of the material;

providing a source of acoustic waves at a zero wavenumber;

positioning said specimen at a distance from said source such that said acoustic waves conform to plane waves;

exciting said specimen with said acoustic waves;

measuring transfer function data subsequent said excitation of said specimen;

calculating said transfer function data to closed form; and

determining the real and imaginary dilatational wavespeed of said specimen from said calculated transfer function data.

2. The method in accordance with claim 1, said method comprising the further steps of:

exciting said specimen for at least two nonzero wavenumbers;

measuring transfer function data subsequent to the excitation of said specimen for at least two nonzero wavenumbers;

calculating said transfer function data to closed form subsequent to said measuring step of said specimen for said excitation for at least two nonzero wavenumbers; and

determining an estimated real and imaginary shear wavespeed of the material from said transfer function data calculated to closed form subsequent to said measuring step of said specimen for said excitation for at least two nonzero wavenumbers.

3. The method in accordance with claim 2, said method comprising the further step of obtaining a real and imaginary shear modulus of the material from said real and imaginary determined shear wavespeed.

4. The method in accordance with claim 3, said method comprising the further step of determining a real and imaginary Young's modulus of the material from said obtained shear modulus.

5. The method in accordance with claim 4, said method comprising the further step of obtaining an estimated Poisson's ratio of the material from said determined Young's modulus and said obtained shear modulus.